

COMPLETE LISTING OF THE CLAIMS

The following lists all of the claims that are or were in the above-identified patent application. The status identifiers respectively provided in parentheses following the claim numbers indicate the current statuses of the claims.

1. (Currently Amended) An actuator comprising:
a first region of piezoelectric material;
a support structure; and
a plurality of flexures respectively attaching a plurality separated sections of a
perimeter of the first region to the support structure.
2. (Original) The actuator of claim 1, further comprising first and second electrodes on opposite faces of the first region.
3. (Original) The actuator of claim 2, wherein two of the flexures provide respective electrical connections to the first and second electrodes.
4. (Original) The actuator of claim 2, further comprising:
a second region of piezoelectric material; and
a third electrode, wherein the second electrode is between the first and second regions, the first electrode is on a side of the first region opposite to the second electrode, and the third electrode is on is on a side of the second region opposite to the second electrode.
5. (Currently Amended) The actuator of claim 1, wherein an electric field applied to the first region causes crystal structure change in a plane of the first region causing the region to dish, where in dishing provides a stroke of the actuator.
6. (Currently Amended) The actuator of claim 1, wherein the first region is part of a bimorph.
7. (Currently Amended) The actuator of claim 1, wherein the first region is part of a unimorph.

8. (Original) The actuator of claim 1, wherein a first side of the first region has piezoelectric properties that differ from piezoelectric properties of a second side of the first region.

9. (Currently Amended) The actuator of claim 7, wherein the first side of the first region is chemically reduced.

10. (Currently Amended) The actuator of claim 1, wherein the support structure comprises a substrate underlying the first region.

11. (Original) The actuator of claim 10, wherein the substrate comprises electrically conductive traces that the flexures electrically connect to the electrodes.

12. (Currently Amended) The actuator of claim 1, wherein the support structure comprises a frame surrounding the first region.

13. (Original) An array of actuators having the recited structure of claim 1.

14. (Currently Amended) The array of claim 13, wherein the array comprise a plurality of frames of a hexagonal shape and arranged in a hexagonal array, and the support structure for each actuator in the array comprises a frame having a hexagonal shape, and the frames are arranged in a hexagonal array one of the frames.

15. (Currently Amended) An actuator comprising:
a region comprising a first layer of piezoelectric material that is between a first electrode and a second electrode; and
a plurality of flexures respectively attached to a plurality of separated sections of a perimeter of the region, wherein the perimeter of the region is unsupported except where the flexures attach to the region.

16. (Original) The actuator of claim 15, wherein the plurality of flexures includes:
a first flexure providing an electrical connection to the first electrode; and

a second flexure providing an electrical connection to the second electrode.

17. (Original) The actuator of claim 15, wherein the region further comprises a second layer of piezoelectric material that is between the second electrode and a third electrode.

18. (Currently Amended) The actuator of claim 17, wherein the plurality of flexures includes:

a first flexure providing an electrical connection to the first electrode;
a second flexure providing an electrical connection to the second electrode; and
a third ~~electrode~~ flexure providing an electrical connection to the third electrode

19. (Original) A deformable mirror comprising:
an array of piezoelectric actuators fabricated on a substrate; and
a mirror membrane attached to the ~~array of~~ piezoelectric actuators so that independent actions of the piezoelectric actuators control a contour of the mirror membrane.

20. (Original) The deformable mirror of claim 19, wherein each actuator comprises a bimorph.

21. (Original) The deformable mirror of claim 19, wherein each actuator comprises a RAINBOW.

22. (Original) The deformable mirror of claim 19, wherein each actuator comprises:
a region of piezoelectric material;
a frame surrounding the region; and
flexures attaching a perimeter of the region to the frame.

Claims 23-31 (Canceled)

32. (New) The deformable mirror of claim 19, wherein each of the actuators comprises:

a region formed from a layer of piezoelectric material; and

a plurality of flexures respectively attaching a plurality separated sections of a perimeter of the region to the substrate.

33. (New) The deformable mirror of claim 32, wherein each of the actuators further comprises first and second electrodes on opposite faces of the region.

34. (New) The deformable mirror of claim 33, , wherein each of the actuators further comprises two of the flexures that provide respective electrical connections to the first and second electrodes.

35. (New) The actuator of claim 4, wherein a first, a second, and a third of the flexures provide respective electrical connections to the first, the second, and the third electrodes.

36. (New) The actuator of claim 1, wherein the first regions forms a disk, and the flexures attach to the perimeter of the disk.

37. (New) The actuator of claim 36, wherein the disk is circular.